U.S. COAST GUARD

MARINE SAFETY OFFICE ANCHORAGE

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SAFETY ALERT

CAPSIZE!

A Fishing vessel was lost near Kodiak recently that involved rapid capsizing. The vessel was a small 66 foot coastal dragger. The vessel had just completed a tow and was bringing a full bag aboard when fish began spilling on deck. A checker board broke loose which allowed fish and bag to slide to port. The crew tried to release fish from the starboard side of the bag to even the list, but the vessel continued to roll to port, capsized and then sank.

Several factors seem to have contributed to this accident. The vessel left port with slack fuel tanks forward and no fuel in the aft tanks. The fuel tanks were not baffled. On the fishing grounds as the haul back was initiated, the vessel's crew began to dewater the pressed up fish hold in preparation for putting the catch down, creating another slack tank condition. The spilled fish on deck effectively plugged the scuppers so that when water came aboard it could not drain off. Additionally, the portion of the bag trailing astern acted as a sea anchor holding the vessel stern to in following seas allowing additional water to come aboard.

The combination of free surface effect and a sudden shift of weight on deck, contributed to a change in the metecentric height (GM) of the vessel causing deck edge immersion of the port stern quarter. Once the additional weight of trapped sea water was introduce the resulting shift in GM caused the vessel to capsize.

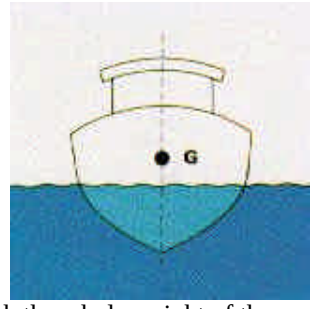
It is important for every skipper to know and understand the limitations of his vessels stability and her ability to carry a load. A basic understanding of stability principles may prevent actions that would endanger a vessel and her crew.

SUSPENDED WEIGHT: The center of gravity of a suspended weight is at the point of suspension. In other words if you lift a heavy bag of fish aboard an all ready loaded or unstable vessel you are putting all the additional weight at the head of the boom, gantry or rigging. The center of gravity will be moved up towards the metacenter of the vessel, resulting in a reduction of righting lever (force) involved in returning the vessel to an upright condition. Also, a strong heeling force will be exerted upon the vessel that could potentially submerge the deck edge and introduce flooding.

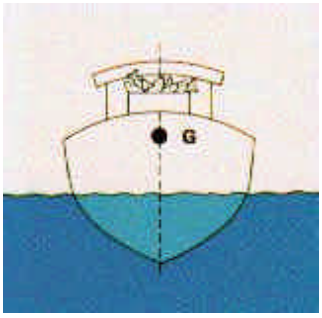
FREE SURFACE: When a vessel with full tanks is heeled the liquid within the tanks act as a solid weight, it's center of gravity remains constant. When a vessel with half filled tanks is heeled, the liquid moves, as it moves, so does the center of gravity. This is an extremely dangerous situation. Loose fish on deck has the same effect as loose or slack tanks. Water trapped on deck and unable to clear the scuppers has the same effect as slack tanks. Half filled tanks have the greatest adverse effect upon a heeled vessel's metacentric height. The division of the tank by baffles will reduce the effect on the vessel's metecentric height.

As a general rule, **never** de-water a fish hold while at sea. If this must be done it needs to be done in away that fish displace the water in the hold simultaneously. To rapidly create a large slack tank while maintaining a large weight on deck underway, is an unsafe practice that could lead to the loss of the vessel.

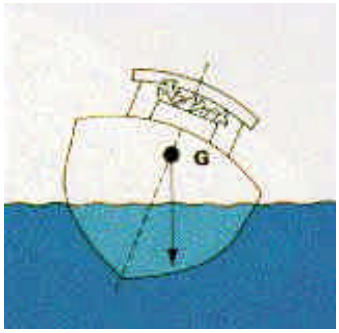
Center of Gravity



The center of gravity (G) is the point at which the whole weight of the vessel can be said to act vertically downward. As a general rule, a lower center of gravity means a more stable vessel.

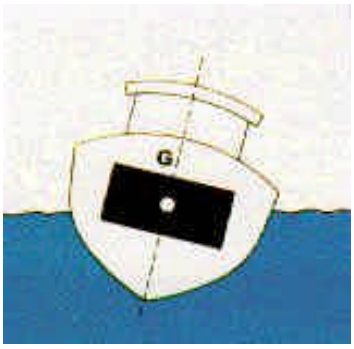


The center of gravity changes, depending on how weight is distributed in the vessel. For example, a heavy load placed high on deck will produce a higher center of gravity- and less stability-than a load stored below deck.

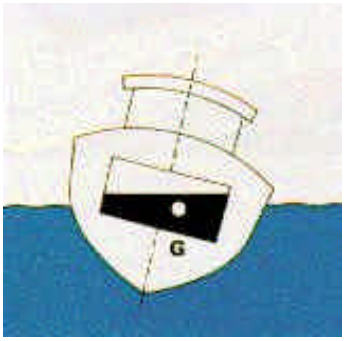


A vessel with a high center of gravity is “top heavy.” If it lists or heels to one side, the center of gravity pushes down in the direction of the list. The danger of capsizing is much greater.

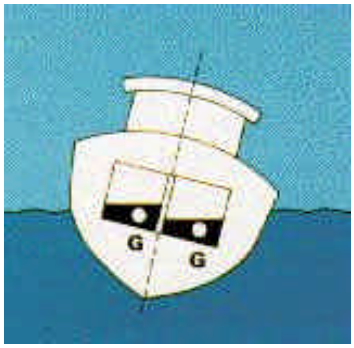
The Free Surface Effect



When a vessel with full tanks heels over, the contents of the tank do not shift. The tank's center of gravity does not change, so it does not affect the vessel's stability.



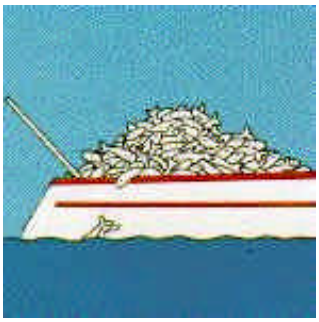
In a partly filled tank or fish hold, the contents will shift with the movement of the boat. This "free surface" effect increases the danger of capsizing.



When a vessel with partially filled spaces heels over, the contents of the spaces will shift. The center of gravity moves over to the side, making the vessel less stable. To avoid this free surface effect, try to have as few partially filled tanks and compartments as possible.

You cannot always avoid partly filled spaces. By dividing a tank into two equal parts with a baffle, the free surface effect is greatly reduced. Using boards to divide fish wells into compartments will also help.

Loose Water or Fish on Deck



Loose fish on deck have the same effect as water. Fish should be properly stowed in the hold as soon as possible to maintain stability.

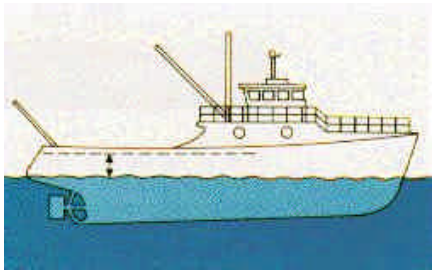
When water is shipped on deck and unable to escape, it creates a large free surface. It also adds weight high in the vessel. Freeing ports (scuppers) are vital for removing shipped water and maintaining stability.

For more information on Stability contact your local Marine Safety Office.

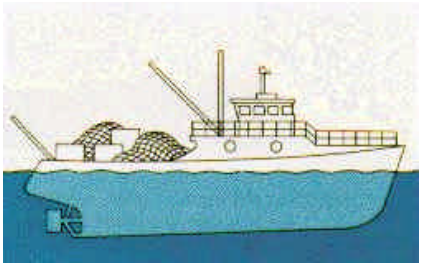
Mr. Charlie Medlicott

SA-2/98

Freeboard



A proper freeboard is essential for stability. Freeboard is the distance between the water and the working deck of the vessel. If the deck edge goes under the water when the vessel heels, the danger of capsizing is great.



An overloaded vessel will have too low a freeboard. The deck will submerge with even a slight heel. Overloading is a major cause of fishing vessels capsizing.